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Kum Foo Leong

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21186

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EXAMINER

RODGERS, COLLEEN E

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/670,975	<b>Applicant(s)</b> LEONG ET AL.	
	<b>Examiner</b> Colleen E. Rodgers	<b>Art Unit</b> 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 August 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13, 21-27 and 31-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 11-13, 21-27, 31-36 and 38-40 is/are rejected.
- 7) ☒ Claim(s) 3, 7-10, 37, 39 and 40 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

1. This office action is responsive to the communication of 31 August 2005. Claims 14-20 and 28-30 are cancelled by Applicant as non-elected **without** traverse.

### *Drawings*

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "550" and "555" have both been used to designate the interfacial layer, sometimes called the interfacial adhesion layer. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

3. The disclosure is objected to because of the following informalities: on both page 3, line 28 and page 4, line 3, replace "substrate120" with --substrate 120-- for correct grammar. On page 5, line 26, replace "extend" with --extends-- for correct grammar. On page 5, line 28, replace "structure" with --structures-- for correct grammar. On page 6, line 20, replace "inter-diffused" with --interdiffused-- for consistency.

Appropriate correction is required.

### *Claim Objections*

4. Claim 3 is objected to because of the following informalities: it depends from itself.

Appropriate correction is required. For the purposes of this office action, it is assumed that claim 3 is meant to be dependent upon claim 2.

5. Claims 39 and 40 are objected to because of the following informalities: they both depend from claim 31 but it is believed that they are meant to depend from claim 38. For purposes of this office action, it is assumed that both of claims 39 and 40 are meant to depend from claim 38. Note: if this is not the case and the dependency is correct as written, applicant is advised that claims 39 and 40 will be rejectable under 35 U.S.C. § 112 because the limitation “the conductive material” in line 2 of both claims lacks sufficient antecedent basis.

### *Claim Rejections - 35 USC § 112*

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 26, 27, 31-34 and 39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claims 26 and 27, one skilled in the art would not be enabled to make the invention because there is no explanation of how the interdiffusion is caused to be nonuniform, or

Art Unit: 2813

how the interdiffusion is caused to form teeth-like structures that extend into the conductive material. According to the instant specification,

**“In some embodiments,** the interdiffusion of the interfacial adhesion material and the conductive material is nonuniform and forms teeth-like structures that extend into the conductive layers at the base of the via” [page 10, lines 20-23, emphasis added].

No explanation is given, however, as to how the diffusion could be nonuniform (forming teeth) in some embodiments and uniform in others.

Regarding claim 31, one skilled in the art would not be enabled to make the invention because, as best understood, the term “stitching” is meant to define the formation of teeth-like structures due to interdiffusion. According to the instant specification,

**“In some embodiments,** the interdiffusion of the interfacial adhesion material and the conductive material is nonuniform and forms teeth-like structures that extend into the conductive layers at the base of the via” [page 10, lines 20-23, emphasis added].

No explanation is given, however, as to how the diffusion could be nonuniform (forming teeth) in some embodiments and uniform in others.

Regarding claim 32, one skilled in the art would not be enabled to make the invention because there is no explanation of how the solid solution is caused to be formed. According to the instant specification,

**“In one embodiment,** the interfacial adhesion material 450 is palladium and the conductive material 412, 414, 418 is copper. The palladium forms a solid solution with the copper. **In some embodiments** the interfacial adhesion material 450 interdiffuses with the conductive material 412, 414, 418” [page 6, lines 10-14, emphasis added].

No explanation is given, however, as to how the palladium and copper may form a solid solution in some embodiments and not in others.

Art Unit: 2813

Regarding claim 33, one skilled in the art would not be enabled to make the invention because there is no explanation as to how the plurality of structures are caused to be formed.

According to the instant specification,

**“In some embodiments** the interfacial adhesion material 450 interdiffuses with the conductive material 412, 414, 418. The interdiffusion of the interfacial adhesion material and the conductive material forms a plurality of structures 451, 452 that extend into the conductive material 412, 414, 418. The plurality of interdiffused structures 451, 452 form a stitched bonding between the base 404 of the feature or via 400 and the second level of circuitry 420 to which the via 400 connects” [page 6, lines 12-20, emphasis added].

No explanation is given, however, as to how the interfacial adhesion material interdiffuses, forming the plurality of structures, in some embodiments and not in others.

Regarding claim 34, one skilled in the art would not be enabled to make the invention because there is no explanation as to how the stitching causes the formation of teeth-like structures that extend into the conductive material. According to the instant specification,

**“In some embodiments,** the interdiffusion of the interfacial adhesion material and the conductive material is nonuniform and forms teeth-like structures that extend into the conductive layers at the base of the via” [page 10, lines 20-23, emphasis added].

No explanation is given, however, as to how the diffusion could be nonuniform (forming teeth, hence stitching the layers) in some embodiments and uniform (with no stitching) in others.

Regarding claim 39, one skilled in the art would not be enabled to make the invention because there is no explanation as to how the plurality of structures are caused to be formed.

According to the instant specification,

**“In some embodiments** the interfacial adhesion material 450 interdiffuses with the conductive material 412, 414, 418. The interdiffusion of the interfacial adhesion material and the conductive

Art Unit: 2813

material forms a plurality of structures 451, 452 that extend into the conductive material 412, 414, 418. The plurality of interdiffused structures 451, 452 form a stitched bonding between the base 404 of the feature or via 400 and the second level of circuitry 420 to which the via 400 connects” [page 6, lines 12-20, emphasis added].

No explanation is given, however, as to how the interfacial adhesion material interdiffuses, forming the plurality of structures, in some embodiments and not in others.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1, 4, 23-27 and 31-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, it is stated that the base of the via contacts some conductive material at its base in lines 2-3. In line 5, another conductive material is placed over the interfacial material that has been placed inside the base of the via. It is unclear whether the conducting materials as claimed are the same or different.

Regarding claim 4, the interfacial material is said to diffuse into the conducting material, but it is unclear to which conducting material this is referring.

Regarding claim 27, it is stated that the interdiffusion of the interfacial adhesion material and the conductive material forms teeth-like structures that extend into the conductive layers at the base of the via. It is unclear what this is referring to, as neither of claims 21 or 25, from which claim 27 depends, claims a conductive material that is at the base of the via, only the conductive material that is atop the interfacial layer.

Regarding claim 33, it is unclear what is meant by “forming a plurality of structures of the interfacial adhesion layer and the conductive material.”

Claim 23 recites the limitation "the materials" in the first line. There is insufficient antecedent basis for this limitation in the claim. Independent claim 21 from which it depends claims only “an interfacial adhesion layer,” with no mention of any “material” and certainly not “materials” in the plural.

Claim 24 recites the limitation "the materials" in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim. See claim 23 above for argument.

Claim 25 recites the limitation "the conductive material" in line 2. There is insufficient antecedent basis for this limitation in the claim. The conductive material is not present in the claims until claim 22, so claim 25 should depend from claim 22.

Claim 26 recites the limitation "the conductive material" in line 2. There is insufficient antecedent basis for this limitation in the claim. See claim 25 above for argument.

Claim 27 recites the limitations "the conductive material" and "the conductive layers" in lines 2 and 3. There is insufficient antecedent basis for this limitation in the claim. See claim 25 above for argument.

Claim 32 recites the limitation "a solution" in line 2. There is insufficient antecedent basis for this limitation in the claim. The specification provides support for “a solid solution” [see page 6, lines 9-12], which is understood to mean something entirely different to one skilled in the art than “a solution.”

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the



Art Unit: 2813

applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term “stitching” in claims 31-35 is used by the claim, as understood, to mean “interdiffusing”, while the accepted meaning is “a periodic and redundant interlevel connection of a long low-conductance line to a high-conductance line.” The term is indefinite because the specification does not clearly redefine the term.

### *Claim Rejections - 35 USC § 102*

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1, 5, 6, 11, 13 and 21-24 are rejected under 35 U.S.C. 102(a) as being anticipated by **Chan et al** (USPN 6,495,200 B1).

Regarding claim 1, **Chan et al** discloses a method for forming a via in an integrated circuit packaging substrate comprising: making a via opening **14** having a base [see Fig. 1A], the base of the via positioned at a selected level that includes conductive material within the integrated circuit packaging substrate [see col. 3, lines 53-56]; depositing an interfacial layer **13** within the at the base of the opening [see Fig. 1A]; placing a conductive material **16** over the interfacial material **13**; and heating the materials at the base of the opening [see col. 4, lines 30-34].

Art Unit: 2813

Regarding claims 5 and 6, **Chan et al** discloses the method of claim 1 as described above, wherein the interfacial material includes palladium [see col. 4, lines 27-34].

Regarding claim 11, **Chan et al** discloses the method of claim 1 as described above, wherein placing a conductive material over the interfacial material includes plating copper 16 within the via opening [see col. 2, step f)].

Regarding claim 13, **Chan et al** discloses the method of claim 1 as described above, wherein the via is capped with Pd 17B [see Fig. 2C, col. 2, lines 33-35].

Regarding claim 21, **Chan et al** discloses a method for forming a via in an integrated circuit package substrate comprising: embedding an interfacial adhesion layer 13 at a base of a via; and heating at least the interfacial adhesion layer [see col.4, lines 30-34].

Regarding claim 22, **Chan et al** discloses the method of claim 21 as described above, wherein embedding the interfacial adhesion layer 13 further includes placing a conductive material 16 over the interfacial adhesion layer.

Regarding claim 23, **Chan et al** discloses the method of claim 21 as described above, wherein heating the materials at the base of the via includes directing the energy of a laser at the base of the via [see col. 4, lines 30-34].

Regarding claim 24, **Chan et al** discloses the method of claim 21 as described above, wherein heating the materials at the base of the via includes heating the materials at the base of the via to a temperature from 250°C to 400°C.

12. Claims 1, 4, 11-13, 21, 25, 31, 35, 36, 38 and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by **Kailasam** (US Patent Application Publication 2005/0181598).

Regarding claim 1, **Kailasam** discloses a method discloses a method for forming a via in an integrated circuit packaging substrate comprising: making a via opening 8 (called “feature”) having a base [see Fig. 1], the base of the via positioned at a selected level that includes conductive material within the integrated circuit packaging substrate [see Fig. 1]; depositing an interfacial layer 22 (called “adhesion layer”) within the at the base of the opening [see Fig. 2]; placing a conductive material 24 (called “diffusion barrier”) over the interfacial material 22; and heating the materials at the base of the opening [see paragraph 0014].

Regarding claim 4, **Kailasam** discloses the method of claim 1 as described above, wherein the interfacial material is a material that will diffuse into the conductive material at the temperature produced by heating the materials at the base of the via opening [see paragraph 0014].

Regarding claim 11, **Kailasam** discloses the method of claim 1 as described above, wherein placing a conductive material over the interfacial material includes plating copper 32, 34 within the via opening [see paragraph 0014].

Regarding claim 12, **Kailasam** discloses the method of claim 1 as described above, wherein placing a conductive material over the interfacial material further comprises plating copper by either electroless or electrolytic methods [see paragraph 0014].

Regarding claim 21, **Kailasam** discloses a method for forming a via 8 in an integrated circuit package substrate comprising: embedding an interfacial adhesion layer 22 at a base of a via; and heating at least the interfacial adhesion layer [see paragraph 0014].

Regarding claim 22, **Kailasam** discloses the method of claim 21 as described above, wherein embedding the interfacial adhesion layer 22 further includes placing a conductive material 24 over the interfacial adhesion layer.

Regarding claim 25, **Kailasam** discloses the method of claim 21 as described above, wherein the interfacial adhesion material 22 interdiffuses with the conductive material 24 [see paragraphs 0014 and 0032]. **Kailasam** discloses that heating the structure “[causes] a reaction between the ... adhesion layer and the diffusion barrier.” Insofar as Applicants’ invention is enabled, it is assumed that as the method of **Kailasam** is the same as the method of the instant application, it must yield the same result.

Regarding claim 31, **Kailasam** discloses a method for forming a via in an integrated circuit package substrate comprising: placing an interfacial adhesion layer 22 at the base of a via 8; placing a conductive material 24 over the interfacial adhesion layer; and stitching the interfacial adhesion layer and the conductive material [see paragraphs 0014 and 0032]. **Kailasam** discloses that heating the structure “[causes] a reaction between the ... adhesion layer and the diffusion barrier.” Insofar as Applicants’ invention is enabled, it is assumed that as the method of **Kailasam** is the same as the method of the instant application, it must yield the same result.

Regarding claim 35, **Kailasam** discloses the method of claim 31 as described above, wherein stitching the interfacial adhesion layer and the conductive material includes heating the materials at the base of the via [see paragraphs 0014 and 0032]. **Kailasam** discloses that heating the structure “[causes] a reaction between the ... adhesion layer and the diffusion barrier.” Insofar as Applicants’ invention is enabled, it is assumed that as the method of **Kailasam** is the same as the method of the instant application, it must yield the same result.

Regarding claim 36, **Kailasam** discloses the method of claim 35 as described above, wherein heating the materials at the base of the via includes heating the materials at the base of the via to a temperature within the range of 400-600°C [see paragraph 0014].

Regarding claim 38, **Kailasam** discloses a method for forming a via in an integrated circuit package substrate comprising: placing an interfacial adhesion layer 22 at a base of a via 8; placing a conductive material 24 over the interfacial adhesion layer; and interdiffusing the interfacial adhesion layer and the conductive material [see paragraphs 0014 and 0032]. **Kailasam** discloses that heating the structure “[causes] a reaction between the ... adhesion layer and the diffusion barrier.” Insofar as Applicants’ invention is enabled, it is assumed that as the method of **Kailasam** is the same as the method of the instant application, it must yield the same result.

Regarding claim 40, **Kailasam** discloses the method of claim 38 as described above, wherein stitching the interfacial adhesion layer and the conductive material includes heating the materials at the base of the via [see paragraphs 0014 and 0032]. **Kailasam** discloses that heating the structure “[causes] a reaction between the ... adhesion layer and the diffusion barrier.” Insofar as Applicants’ invention is enabled, it is assumed that as the method of **Kailasam** is the same as the method of the instant application, it must yield the same result.

### ***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan et al** (USPN 6,495,200 B1) in view of **Cohen et al** (US Patent Application Publication 2005/0215046 A1).

Regarding claim 2, **Chan et al** discloses the method of claim 1 as described above. **Chan et al** does not disclose the step of masking the surface of the integrated circuit packaging substrate, a mask being formed having a mask opening therein positioned above to the base of the via opening. **Cohen et al** discloses the use of a conformable contact (CC) mask for use in selective deposition, wherein the conformable material for each mask is shaped in accordance with a cross-section of the material to be plated [see paragraph 0020]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the mask of **Cohen et al** during the deposition steps of **Chan et al** because the conformable material of the CC mask of **Cohen et al** acts as a barrier to electrodeposition [see paragraph 0022].

Regarding claim 3, the prior art of **Chan et al** and **Cohen et al** discloses the method of claim 2 as described above. **Cohen et al** further discloses the step of removing the mask [see paragraph 0023]. It would have been obvious to one of ordinary skill in the art at the time of invention to remove the mask of **Cohen et al** following the deposition steps of **Chan et al** because the conformable material of the CC mask of **Cohen et al** would act as a barrier to further process steps as well, which is non-desirable.

15. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kailasam** (US Patent Application Publication 2005/0181598 A1) in view of **Cohen et al** (US Patent Application Publication 2005/0215046 A1).

Regarding claim 2, **Kailasam** discloses the method of claim 1 as described above. **Kailasam** does not disclose the step of masking the surface of the integrated circuit packaging substrate, a mask being formed having a mask opening therein positioned above to the base of the via opening. **Cohen et al** discloses the use of a conformable contact (CC) mask for use in selective deposition,

Art Unit: 2813

wherein the conformable material for each mask is shaped in accordance with a cross-section of the material to be plated [see paragraph 0020]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the mask of **Cohen et al** during the deposition steps of **Kailasam** because the conformable material of the CC mask of **Cohen et al** acts as a barrier to electrodeposition [see paragraph 0022].

Regarding claim 3, the prior art of **Kailasam** and **Cohen et al** discloses the method of claim 2 as described above. **Cohen et al** further discloses the step of removing the mask [see paragraph 0023]. It would have been obvious to one of ordinary skill in the art at the time of invention to remove the mask of **Cohen et al** following the deposition steps of **Kailasam** because the conformable material of the CC mask of **Cohen et al** would act as a barrier to further process steps as well, which is non-desirable.

#### *Allowable Subject Matter*

16. Claims 7-10 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 7-10, the prior art of record fails to teach or make obvious the use of a laser to heat **both** the interfacial layer and the conductive layer as stated in claim 7. **Chan et al** teaches using a laser to heat the interfacial layer (called the “seeding film”) to a temperature of 250-400°C, but this step occurs prior to the addition of the conductive layer. The further limitations of claims 8-10, therefore, are also not taught or suggested in combination with the other elements of claim 1.

Art Unit: 2813

Regarding claim 37, the prior art of record fails to teach or make obvious the use of a laser to cause the interdiffusion or stitching of the materials at the base of the via.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen E. Rodgers whose telephone number is (571) 272-8603. The examiner can normally be reached on Monday through Friday, 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CER

  
**GEORGE ECKERT**  
**PRIMARY EXAMINER**